

CLAIMS

What is claimed is:

- 1 1. A method for generating random numbers comprising:
 - 2 providing a liquid crystal cell containing a liquid crystal material between
 - 3 substrates, each substrate having a facing electrode;
 - 4 applying a potential difference across said electrodes;
 - 5 measuring at least one physical property of said liquid crystal material to
 - 6 generate a plurality of reading measurements; and
 - 7 setting bits based on said plurality of reading measurements to generate a
 - 8 sequence of random numbers.
- 1 2. The method of claim 1, wherein said at least one physical property is selected from
 - 2 the group consisting of light absorbed by the liquid crystal, light transmitted by the
 - 3 liquid crystal, light reflected by the liquid crystal, and the amount of electric current
 - 4 traversing the liquid crystal.
- 1 3. The method of claim 1, further comprising
 - 2 first measuring said at least one physical property to generate a baseline
 - 3 measurement;
 - 4 subsequently measuring said at least one physical property to generate a
 - 5 plurality of reading measurements; and
 - 6 setting said bits based on a comparison of said baseline measurement to said
 - 7 plurality of reading measurements.
- 1 4. The method of claim 1, wherein said liquid crystal material comprises nematic liquid
 - 2 crystal.
- 1 5. The method of claim 1, wherein said applying step causes the liquid crystal material
 - 2 to undergo a chaotic turbulent flow.
- 1 6. The method of claim 1, wherein said at least one physical property comprises a
 - 2 plurality of light sources directing light toward said liquid crystal cell and a like

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3 plurality of light detectors to measure properties of the light after impinging said
4 liquid crystal cell.

1 7. An apparatus for the generation of random numbers comprising:
2 a pair of opposed substrates containing a layer of liquid crystal therebetween
3 each said substrate having an electrode facing the other said substrates;
4 a power supply applying an electric potential across said electrodes to drive
5 said liquid crystal into a chaotic flow;
6 at least one device for measuring a physical property of said layer of liquid
7 crystal which generates physical property measurements after an electric potential
8 is applied; and
9 an interface in communication with said device for measuring a physical
10 property, wherein said interface digitizes said physical property measurements to
11 generate a random number.

1 8. The apparatus according to claim 7, further comprising:
2 a computer program connected to said interface, wherein said computer
3 program processes said digitized measurements into random numbers for use in
4 encrypting data.

1 9. The apparatus according to claim 7, wherein said layer of liquid crystal is a nematic
2 material.

1 10. A method of encrypting data comprising:
2 providing a liquid crystal cell responsive to an electrical stimulus;
3 applying an electrical stimulus to said liquid crystal cell;
4 measuring at least one physical property of said liquid crystal cell to generate
5 a baseline measurement;
6 setting a plurality of bits based on said baseline measurement so as to generate
7 a sequence of random numbers; and
8 using said sequence of random numbers to generate an encryption key.

1 11. The method according to claim 10, further comprising:

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2 applying said encryption key to data transmitted by a computing device.

1 12. The method according to claim 10 further comprising

2 subsequently measuring the at least one physical property of said liquid crystal
3 cell to generate a plurality of reading measurements;

4 determining the difference between each of said reading measurements and the
5 baseline measurement; and

6 setting said plurality of bits based on differences between said plurality of
7 reading measurements and said baseline measurement to generate said sequence of
8 random numbers.

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